REMARKS

The Office Action dated May 5, 2004, has been received and carefully considered. In this response, claims 9 and 21 have been amended, and claims 22-25 have been cancelled without prejudice. Entry of the amendments to claims 9 and 21, and the cancellation of claims 22-25, is respectfully requested. Reconsideration of the outstanding rejections in the present application is also respectfully requested based on the following remarks.

At the outset, Applicant notes with appreciation the indication on page 6 of the Office Action that claims 1-8 and 10-20 are allowed.

I. <u>THE ANTICIPATION REJECTION OF CLAIM 9</u>

On pages 2-3 of the Office Action, claim 9 was rejected under 35 U.S.C. § 102(b) as being anticipated by Shapiro (U.S. Patent No. 5,315,670). This rejection is hereby respectfully traversed with amendment.

Under 35 U.S.C. § 102, the Patent Office bears the burden of presenting at least a prima facie case of anticipation. <u>In re Sun</u>, 31 USPQ2d 1451, 1453 (Fed. Cir. 1993) (unpublished). Anticipation requires that a prior art reference disclose, either expressly or under the principles of inherency, each and every element of the claimed invention. <u>Id.</u>. "In addition, the

prior art reference must be enabling." Akzo N.V. v. U.S. International Trade Commission, 808 F.2d 1471, 1479, 1 USPQ2d 1241, 1245 (Fed. Cir. 1986), cert. denied, 482 U.S. 909 (1987). That is, the prior art reference must sufficiently describe the claimed invention so as to have placed the public in possession of it. In re Donohue, 766 F.2d 531, 533, 226 USPQ 619, 621 (Fed. Cir. 1985). "Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention." Id..

The Examiner asserts that Shapiro teaches the claimed invention. However, it is respectfully submitted that Shapiro fails to claim, disclose, or even suggest a method for image compression comprising recursively transforming an image using Discrete Wavelet Transform to create a plurality of levels; quantizing the transformed image at each level; and encoding the quantized image at a first level using adaptive run-length coding of zero coefficients, a second level using run-length coding of zero coefficients and a predetermined two-knob Huffman table for non-zero coefficients, and a third level using low frequency coding, as presently claimed. In particular, it is respectfully submitted that Shapiro fails to claim, disclose, or even suggest encoding the quantized image at a first level using adaptive run-length coding of zero coefficients, a second level

using run-length coding of zero coefficients and a predetermined two-knob Huffman table for non-zero coefficients, and a third level using low frequency coding, as presently claimed. Indeed, the Examiner has acknowledged this lack of teaching by Shapiro in the Office Action dated November 18, 2003. Accordingly, it is respectfully submitted that claim 9 is not anticipated by Shapiro.

In view of the foregoing, it is respectfully requested that the aforementioned anticipation rejection of claim 9 be withdrawn.

II. THE ANTICIPATION REJECTION OF CLAIMS 21 AND 24

On page 3 of the Office Action, claims 21 and 24 were rejected under 35 U.S.C. § 102(e) as being anticipated by Taubman et al. (U.S. Patent No. 6,546,143). This rejection is hereby respectfully traversed with amendment.

Regarding claim 21, the Examiner asserts that Taubman et al. teaches the claimed invention. However, it is respectfully submitted that Taubman et al. fails to claim, disclose, or even suggest a method for compressing image data comprising encoding using adaptive run-length coding of zero coefficients for a first level of a transformation of the image data; encoding using run-length coding of zero coefficients and a predetermined two-knob Huffman coding of non-zero coefficients for a second

level of the transformation of the image data; and encoding using a low frequency packing algorithm for a third level of the transformation of the image data, as presently claimed. Indeed, the Examiner has acknowledged this lack of teaching by Taubman et al. in the Office Action dated May 5, 2004. Accordingly, it is respectfully submitted that claim 21 is not anticipated by Taubman et al.. Furthermore, claim 21 would also not have been obvious in view Taubman et al. and Wu et al. for the reasons described below.

Claim 24 has been cancelled without prejudice.

In view of the foregoing, it is respectfully requested that the aforementioned anticipation rejection of claims 21 and 24 be withdrawn.

III. THE OBVIOUSNESS REJECTION OF CLAIMS 22, 23, AND 25

On pages 4-6 of the Office Action, claims 22, 23, and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Taubman et al. (U.S. Patent No. 6,546,143) in view of Wu et al. (U.S Patent No. 6,353,685). This rejection is hereby respectfully traversed.

As stated in MPEP § 2143, to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of

ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Also, as stated in MPEP § 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Further, as stated in MPEP § 2143.01, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). That is, "[a]ll words in a claim must be considered in judging the patentability

of that claim against the prior art." In re Wilson, 424 F.2d 1382, 165 USPQ 494, 496 (CCPA 1970). Additionally, as stated in MPEP § 2141.02, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Finally, if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The Examiner acknowledges that Taubman et al. fails to teach any specifics regarding the claimed encoding steps. However, the Examiner asserts that Wu et al. teaches these specifics.

Claims 22, 23, and 25 have been cancelled without prejudice. However, it is still noted that Wu et al. fails to teach specifics regarding the claimed encoding steps. For example, the Examiner asserts that Wu et al. teaches low-frequency differential datapacking of a plurality of coefficients on a row-wise fashion, including a DC coefficient. The Examiner specifically points to column 6, lines 39-57, of Wu et al. for this teaching. However, it is respectfully submitted that Wu et al. does not teach low-frequency differential datapacking of a plurality of coefficients on a row-wise

fashion, including a DC coefficient. Rather, Wu et al. merely describes the transmission of a DC coefficient, not low-frequency differential datapacking of a plurality of coefficients on a row-wise fashion, including a DC coefficient. Indeed, Wu et al. fails to claim, disclose, or even suggest encoding using a low frequency packing algorithm for a third level of the transformation of the image data, as presently recited in claim 21. As stated in MPEP § 2143.01, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 22, 23, and 25 be withdrawn.

IV. CONCLUSION

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-0206, and please credit any excess fees to the same deposit account.

Respectfully submitted,

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APPENDIX A

1 (Previously Amended). A method for image compression comprising the steps of:

recursively transforming an image using Discrete Wavelet Transform to create a plurality of levels including at least a first level, multiple intermediate levels, and a low-low pass subband level;

quantizing the transformed image at each level; and

datapacking the quantized image by:

encoding the first level using adaptive run length coding of zero coefficients;

encoding at least one of the multiple intermediate levels using run-length coding of zero coefficients and a predetermined two-knob Huffman table for non-zero coefficients; and

encoding the low-low pass subband level using a low frequency packing algorithm.

2 (Previously Amended). The method of claim 1, wherein the step of encoding the first level further comprises the steps of:

scanning the quantized image to find a largest coefficient magnitude;

storing the largest non-zero coefficient magnitude in a header;

run-length coding the zero coefficients in the quantized image; and

encoding the non-zero coefficients using a predetermined Huffman table.

3 (Previously Amended). The method of claim 2, wherein the step of encoding the first level further comprises the steps of:

if a non-zero coefficient is not found in the predetermined Huffman table, encoding an escape code and encoding the non-zero coefficient in a signed bit representation.

4 (Previously Amended). The method of claim 3, wherein the step of encoding the first level further comprises the steps of:

encoding a run in the quantized image by using three bits; and

if three bits are insufficient to write the run, encoding a zero codeword.

5 (Previously Amended). The method of claim 1, wherein the step of encoding at least one of the multiple intermediate levels further comprises the steps of:

scanning the quantized image after run-length coding of the zero coefficients to find the longest run; and

storing the longest run.

6 (Previously Amended). The method of claim 5, wherein the step of encoding at least one of the multiple intermediate levels further comprises the step of:

determining a long run or a short run based on the magnitude of the longest run.

7 (Previously Amended). The method of claim 1, wherein the step of encoding the low-low pass subband level using the low frequency algorithm includes the step of:

calculating a difference between a plurality of DC coefficients and a plurality of AC coefficients, thereby defining a plurality of DC difference values.

8 (Previously Amended). The method of claim 7, further comprising the step of:

writing the DC coefficients and the DC difference values to an encoded data stream in unsigned bit representation in a row-wise manner.

9 (Currently Amended). A method for image compression comprising the steps of:

recursively transforming an image using Discrete Wavelet Transform to create a plurality of levels;

quantizing the transformed image at each level; and

encoding the quantized image at ~~each~~ a first level using adaptive run-length coding of zero coefficients, a second level using run-length coding of ~~a plurality of~~ zero coefficients and a predetermined two-knob Huffman table for ~~a plurality of~~ non-zero coefficients, and a third level using low frequency coding.

10 (Previously Amended). An encoder for compressing image data comprising:

a two-dimensional discrete wavelet filter for transforming the image data into a plurality of coefficients forming a first level, multiple intermediate levels, and a low-low pass subband level;

a quantizer for mapping the coefficients into discrete regions by a predetermined compression parameter; and

a datapacker for compressing the mapped coefficients wherein the datapacker encodes a plurality of zero coefficients at the first level by adaptive run length coding, encodes a plurality of non-zero coefficients at one or more of the intermediate levels by a two-knob Huffman coding, and encodes the low-low pass subband level by low frequency coding.

11 (Previously Amended). The encoder of claim 10, wherein the datapacker is adapted to:

scan the mapped coefficients of the first level to find a largest coefficient magnitude;

store the largest non-zero coefficient magnitude in a header; and

run-length code the zero coefficients.

12 (Previously Amended). The encoder of claim 11, wherein the datapacker encodes the non-zero coefficients of the first level using a predetermined Huffman table after run length coding of the zero coefficients.

13 (Previously Amended). The encoder of claim 12, wherein the datapacker encodes a run of zero coefficients of the first level by writing a zero indicator followed by a predetermined number of data elements.

14 (Previously Amended). The encoder of claim 13, wherein the datapacker encodes an additional zero indicator at the first level if the predetermined number of data elements are insufficient to write the run.

15 (Previously Amended). The encoder of claim 10, wherein the datapacker encodes a difference between a plurality of DC coefficients and a plurality of AC coefficients at the low-low

pass subband level.

16 (Previously Amended). A computer readable medium having a program for performing image compression, the program being adapted to:

recursively transform an image using Discrete Wavelet Transform to create a plurality of levels including at least a first level, multiple intermediate levels, and a low-low pass subband level;

quantizing the transformed image at each level; and

datapacking the quantized image by:

encoding the first level using adaptive run length coding of zero coefficients;

encoding at least one of the multiple intermediate levels using run-length coding of zero coefficients and a predetermined two-knob Huffman table for non-zero coefficients; and

encoding the low-low pass subband level using a low frequency packing algorithm.

17 (Currently Amended). A method for compressing a digital image data set comprising the steps of:

performing a plurality of two-dimension discrete wavelet transformations on the data set, wherein the plurality of

transformations includes a first level, a plurality of intermediate levels, and a low-low pass subband level;

quantizing the plurality of transformations;

datapacking the quantized first level using a first packing algorithm;

datapacking at least one of the plurality of quantized intermediate levels using a second packing algorithm; and

datapacking the low-low pass subband level using a third packing algorithm.

18 (Previously Amended). The method of claim 17, wherein the first packing algorithm includes:

adaptive run-length coding of a plurality of zero coefficients.

19 (Previously Amended). The method of claim 17, wherein the second packing algorithm includes:

run-length coding of a plurality of zero coefficients; and

two-knob Huffman coding of a plurality of non-zero coefficients.

20 (Previously Amended). The method of claim 13, wherein the third packing algorithm includes:

low-frequency differential datapacking of a plurality of

coefficients on a row-wise fashion, including a DC coefficient.

21 (Currently Amended). A method for compressing image data comprising the steps of:

encoding using ~~a first packing algorithm~~ adaptive run-length coding of zero coefficients for a first level of a transformation of the image data; ~~and~~

encoding using ~~a second packing algorithm~~ run-length coding of zero coefficients and a predetermined two-knob Huffman coding of non-zero coefficients for a second level of the transformation of the image data; and

encoding using a low frequency packing algorithm for a third level of the transformation of the image data.

22 - 25 (Cancelled).